CLAIMS

1. A method of detecting a low power condition in a satellite navigation system, comprising:

receiving at least one global positioning satellite radio signal;

determining a signal-to-noise ratio of the satellite radio signal; and

calculating from the signal-to-noise ratio a low-power condition error contribution.

2. The method of claim 1, wherein determining the signal-to-noise ratio includes:

measuring a wide band power of the satellite radio signal over a first time period;

measuring a narrow band power of the satellite radio signal over a second time period;

calculating an estimated signal-to-noise ratio based on the narrow band power and the wide band power.

3. The method of claim 2, wherein measuring a wide band power includes averaging the wide band power over the first time period to obtain the value P_w, and wherein measuring a narrow band power includes averaging the narrow band power over the second time period to obtain the value P_n.

4. The method of claim 3, wherein the first time period has a length T, the second time period has a length that is M times as long as T, and the signal-to-noise ratio S/No is calculated according to the following equation.

$$S/No = 10 \log_{10} \left[\frac{1}{T} \frac{P_n - P_w}{MP_w - P_n} \right]$$

5. The method of claim 2, wherein calculating an estimated signal-to-noise ratio includes calculating a lower confidence limit.

6. The method of claim 5, wherein determining a signal-to-noise ratio comprises determining a lower confidence limit of the signal-to-noise ratio.

7. The method of claim 6, wherein determining a lower confidence limit includes calculating an estimated signal-to-noise ratio and subtracting a confidence offset from the estimated signal-to-noise ratio.

8. The method of claim 7, wherein the confidence offset dS/No_low is determined by the following equation:

$$P_{\text{lim}} = \int_{-dS/No\_low}^{\infty} \text{pdf}(x)\, dx.$$

9. The method of claim 1, further comprising calculating a total error based at least in part on the low-power condition error contribution.

10. The method of claim 9, further comprising determining whether the total error exceeds an alert limit, and issuing an alert if the error exceeds the alert limit.

11. A method of detecting a low power condition in a local area augmentation system, comprising:

receiving a global positioning satellite radio signal;

determining a navigational measurement based at least in part on the received radio signal;

determining a signal-to-noise ratio of the received radio signal; and

determining an error in the navigational measurement based at least in part on the signal-to-noise ratio.

12. The method of claim 11, wherein determining the signal-to-noise ratio includes:

measuring a wide band power of the satellite radio signal over a first time period;

measuring a narrow band power of the satellite radio signal over a second time period;

determining a signal-to-noise ratio based on the narrow band power and the wide band power.

13. The method of claim 12, wherein measuring a wide band power includes averaging the wide band power over the first time period to obtain the value P_w, and wherein measuring a narrow band power includes averaging the narrow band power over the second time period to obtain the value P_n.

14. The method of claim 13, wherein the first time period has a length T, the second time period has a length that is M times as long as T, and the signal-to-noise ratio S/No is calculated according to the following equation.

$$S/No = 10 \log_{10} \left[\frac{1}{T} \frac{P_n - P_w}{MP_w - P_n} \right]$$

15. The method of claim 11, wherein determining a signal-to-noise ratio includes calculating a lower confidence limit.

16. The method of claim 15, wherein determining a signal-to-noise ratio comprises determining a lower confidence limit of the signal-to-noise ratio.

17. The method of claim 16, wherein determining a lower confidence limit includes calculating an estimated signal-to-noise ratio and subtracting a confidence offset from the estimated signal-to-noise ratio.

18. The method of claim 17, wherein the confidence offset dS/No_low is determined by the following equation:

$$P_{\lim} = \int_{-dS/No\_low}^{\infty} \mathrm{pdf}(x)\, dx.$$

19. The method of claim 11, further comprising determining whether the error exceeds an alert limit, and issuing an alert if the error exceeds the alert limit.

20. In a local area augmentation system, a system for detecting a low-power condition comprising:

a wide band power estimator operative to measure an average wide band power;

a narrow band power estimator operative to measure an average narrow band power;

a signal-to-noise ratio module operative to calculate a signal-to-noise ratio from the estimated wide band power and the estimated narrow band power; and

a low-power error module operative to calculate, from the signal-to-noise ratio, an error contribution attributable to a low-power condition.

21. The system of claim 20, wherein:

the signal-to-noise ratio module further comprises confidence limit logic operative to determine a lower confidence limit; and

wherein the signal-to-noise ratio calculated by the signal-to-noise ratio logic is the lower confidence limit.

22. The system of claim 21, further comprising:

a total error module operative to calculate a total error based at least in part on the low-power condition error contribution; and

alert logic operative to determine whether the total error exceeds an alert limit and to issue an alert if the error exceeds the alert limit